IMPROVING PERFORMANCE IN HIGH SCHOOL ALGEBRA: WHAT STUDENTS WITH LEARNING DISABILITIES ARE SAYING

Larry J. Kortering, Laurie U. deBettencourt, and Patricia M. Braziel

Abstract. **Success in high school algebra is gaining increased importance for all students, including those identified as having learning disabilities (LD). Despite its importance, we know little about what students with and without LD say about their algebra classes. This study examined findings from a survey of 410 general education students and 46 peers with LD. The survey established data relative to the participants' favorite and least favorite classes, most difficult (and best) parts of algebra class, and ideas for helping more students to succeed. In addition, student participants reported whether selected interventions and accommodations were helpful.**

LARRY J. KORTERING, Ed.D., is professor, Appalachian State University.
LAURIE U. deBETTENCOURT, Ph.D., is associate professor, University of Virginia.
PATRICIA M. BRAZIEL, M.A., is project coordinator, Appalachian State University.

Success in high school algebra is becoming increasingly important for today's students. Some authorities suggest that algebra serves a gatekeeper function to entry into postsecondary education (Chambers, 1994; Moses & Cobb, 2001). Their thinking is that high school students must succeed in algebra to gain the knowledge and skills necessary for entry into most colleges. A number of national reports also stress the need for public schools to make progress in helping students to attain higher-level math skills (National Center for Educational Statistics, 2001; Woodward & Montague, 2002). Other reports argue for the importance of algebra skills in today's labor market, especially well-paying jobs and those offering benefits (see Forgione, 1999). In addition, many states require students to pass competency tests containing algebraic problems or algebra classes to obtain a standard high school diploma.

In combination, these various considerations call for increased skills in algebra for all students, with particular attention directed at those planning to pursue a postsecondary education or obtaining a well-paying job. Finally, lack of success in or even access to algebra may be part of the explanation for the low rate of postsecondary schooling among former special education students, including youths with learning disabilities (LD). As shown in several national or regional studies, youth with LD pursue postsecondary schooling at a rate that is half that of their general education peers (Horn, Berktold, & Bobbitt, 1999; Murray, Goldstein, Nourse, & Edgar, 2000).

Almost one of every three youths with LD fail general education high school courses (Blackorby & Wagner, 1997). Specifically in math, secondary teachers have noted that many of these students experience considerable difficulty (Miles & Forcht, 1995; Miller & Mercer, 1997). Adolescents with LD have difficulty with problem application and generally perform at a fifth-grade level in math; put another way, the average 17-year-old

is functioning at a math level expected for the average 10-year-old student without a disability (Cawley & Miller, 1989). Given this performance level, it is not surprising that only 12% of students with mild disabilities take advanced math classes (algebra, geometry, calculus, and trigonometry) (Wagner & Blackorby, 1996).

If algebra classes are critical to success in postsecondary educational settings and well-paying jobs, their role as a gatekeeper makes sense. Thus, youth who fail to access or succeed in algebra are likely to fail to get an education beyond that of high school and be unqualified for many well-paying jobs. If true, this scenario suggests that special educators must work in concert with general educators to deploy interventions that help more youth with LD gain access to and succeed in high school algebra classes.

Researchers recently have shown that specific interventions can promote success in high school algebra classes. For instance, Bottge and his colleagues (Bottge, Heinrichs, Chan, & Serlin, 2001; Bottege, Heinrichs, Mehta, & Hung, 2001) used enhanced anchor instruction to improve the problem-solving and computational skills of small groups of adolescents with disabilities. Their studies have focused on delivering an intervention based on authentic instruction, characterized by having students construct knowledge, deploy disciplined inquiry skills, and work with knowledge that has value beyond school (i.e., real-world implications). Maccini and Hughes (2000) showed that a group of students could learn and then independently deploy a problem-solving strategy involving integer numbers. In this study students moved through concrete operations involving manipulating physical objects, semiconcrete operations like drawing pictorial representations, and eventually abstract applications like writing mathematical symbols to solve algebraic problems. Finally, Allsopp (1997) demonstrated that classwide peer tutoring for general education low-achieving students and peers with LD could be effective. This intervention used trained peer tutors to provide additional support and instruction for low-achieving students.

Earlier research also supports the idea that specific interventions can facilitate student success in algebra. For example, Hutchinson (1993) used strategy instruction to help students solve algebraic word problems with whole numbers. The strategy promoted success by providing a context for learning a specific strategy to solve algebra problems. Gersten and Kelly (1992) investigated the effects of a math curriculum involving features of instructional design versus a basal curriculum for teaching fraction concepts to adolescents with LD and peers at risk of school failure. The instructional design curriculum included videodisc instruction for teaching key concepts. Results showed that such an intervention could yield positive results for both groups of students. In combination, the current and earlier studies suggest that youth with LD can benefit from specific learning strategies, a presentation of algebra with real-world applications, and additional peer support.

Present Study

This study sought to add to the existing knowledge base on how best to help youth with LD to succeed in algebra by offering insight into their perceptions of algebra class. The perceptions of students as consumers of services remain noticeably absent from the existing research. Yet, their views may provide important insight into why some interventions work and how best to tailor new interventions to help more youth to succeed. For instance, it may yield insight into why specific strategies or features prove effective in helping youth to understand algebra or motivate them to be more successful. Such insight may also set the stage for further research on how best to foster success in algebra classes.

The specific questions for this study were as follows:

1. What has been your favorite and least favorite high school class?
2. What has been the best and most difficult part of algebra class?
3. How can we help students to be more successful with the work, quizzes, or tests?
4. What is the most important thing we could do to improve student performance in algebra?

In addition, we asked participants to indicate (yes or no) whether specific interventions or accommodations, identified by the algebra teachers as a group, would help them to do better in their algebra class.

The specific interventions included the following: peer or senior tutors, group or pair activities, graduate student from a nearby university as a class assistant, daily candy incentives, music store incentives (gift certificates for a B or better average or an improvement of one or more letter grades between midterm and final grade), training in test-taking skills, and training in learning strategies. The specific accommodations included additional encouragement from the teacher, reduced distractions in the classroom, more individual or small-group help, and time extensions for tests or homework.

METHOD

The study focused on what students with LD perceive as their best and worst high school classes, the best and worst part of their algebra classes, their ideas for helping more students to be successful, and views of existing teacher-derived interventions or accommodations. Students' responses provide a look at high school algebra from the consumer's perspective. The algebra

classes included a pair of semester classes (Part A and Part B). A student must pass both classes and the end-of-course (EOC) exam in Part B to earn a standard high school diploma. The following sections provide further detail on the study participants, setting, and data-collection procedures.

Participants

Participants responded to a survey during the fall of 2001. The sample included 46 students identified by school personnel as having LD. These participants represented over 95% of all the youth with LD attending the participating school and enrolled in an algebra course. Table 1 provides key demographic information on participants and, when possible, compares them to 410 of their classmates without disabilities who also participated in the survey. These comparisons allow us to consider the potential impact of family- or school-related features. For instance, relative to non-LD peers, participants with LD included a higher representation of males, were more likely to have parents who had not been graduated from high school, and had a higher rate of repeating a grade.

Additional background information on participants with LD came from their most recent psychological report. Measured levels of intelligences (and standard deviations) were as follows: full-scale IQ scores of 92.9 (10.7), verbal scores of 93.8 (12.2), and performance scores of 93.0 (13.1). All IQ scores came from the Wechshler Intelligence Scale for Children-IV. Measured levels of achievement were 80.1 (15.8) for reading composite scores, 86.4 (12.2) for math composite scores, and 74.5 (12.8) for written language composite scores. All achievement scores came from the Woodcock Johnson Test of Educational Achievement – Revised (Woodcock & Bonner, 1989) or Woodcock Johnson Test of Educational Achievement-III (Woodcock, McGrew, & Mather, 2001). Of the participants with LD, fewer than half had been identified as having a significant discrepancy between ability and achievement in math (with or without other areas).

Setting

The study took place in a southeastern U.S. high school. According to Census data from 2000, the population density for the county in which the school was located was ranked 25th among the state's 100 counties. The high school completion rate among adults 25 and over was 67%. The 2000 Census data also showed an unemployment rate of 5.6% (national average = 4.5%) and rates of children living in poverty of 19% (national average = 20%). The median household income was $32,113 (national average = $37,005). The per-pupil expenditures for the 1997/98 school year were $5,060, while the state average was $5,492 (Haynes, 1999). Both these averages are well below the national average.

The school population of 2,100 students had a 20% minority population, including 12% African American, 6% Asian, and 2% Hispanic, non-Latino. The school reported that 21% of its population received free or reduced-cost lunch during the 2000/01 school year. The school had a 94% passing rate on the state's EOC test for algebra Part B, compared to a state average of 76% (www.ncreportcards.org). The passing rate among youth with LD was 57%, which included 13 course failures, 3 withdrawals after the midterm, and 4 dropouts. The average class size for Algebra I A and B was 22 students, compared to a state average of 16 (www.ncreportcards.org). The school has experienced an unusually high level of teacher turnover over the past four years (range of 21% to 28%). Higher than the state average of 15% between 1997 and 2000, this turnover is a function of several factors and has affected the algebra classes. It is hard to empirically document this effect other than to treat it as a unique setting feature.

Materials

The survey was developed and field-tested in the following manner. The initial set of general questions came from a panel of nine teachers representing the content areas of math, science, and English and four special educators working with fully included students. A group of 11 high school algebra teachers, 2 central office administrators, and 1 on-site administrator reviewed the general questions and helped to develop questions specific to algebra class. The revised questions were then administered to over 700 algebra students during the two semesters preceding the study. These administrations served as further screening, and allowed the opportunity to identify problematic wording and to make revisions accordingly.

The survey responses were compiled and each teacher received two sets of responses – one that contained the responses of only their students (general and special education) and one containing the responses of all algebra students. The respective compilations were again reviewed, and the teachers had an opportunity to provide feedback on the data and offer suggestions for additional questions or revisions. Each administrator received the compilation containing the responses of all of the algebra students. The administrators' copy was different from that of the teachers in that it provided a breakout of student responses by gender, race, and handicapping condition.

The specific teacher-derived interventions and accommodations initially came from a list of student suggestions for how to improve performance in algebra class.

Table 1
Participant Background Information

Variable	LD	Non-LD
Sample Size	46	410
Gender: Male	34 (74.2%)	230 (56.1%)
Race:		
Caucasian	33 (71.7%)	291 (71%)
African American	3 (6.5%)	64 (15.6%)
Hispanic	1 (2.2%)	14 (3.4%)
Asian	9 (19.6%)	35 (8.5%)
Other	0	6 (1.2%)
Living Status:		
2 Birth Parents	21 (45.7%)	186 (45.4%)
1 Step/1 Birth	9 (19.6%)	95 (23.2%)
1 Parent	11 (23.9%)	92 (22.4%)
Relatives	5 (10.9%)	35 (8.5%)
Other[1]	0	1 (0.3)
Father's Education:		
4 yrs. College	6 (13%)	64 (15.6%)
Some College	3 (6.5%)	59 (14.4%)
H. S. Diploma[2]	8 (17.4%)	130 (31.7%)
No Diploma	18 (39.1%)	81 (19.8%)
Unsure	11 (23.9%)	76 (18.5%)
Mother's Education:		
4 yrs. College	11 (23.9%)	65 (15.9%)
Some College	3 (6.5%)	61 (14.9%)
H. S. Diploma[2]	6 (13%)	126 (30.7%)
No Diploma	20 (43.5%)	65 (15.9%)
Unsure	6 (13%)	43 (10.5%)
Qualify Free Lunch: Yes	13 (28.3%)	129 (31.5%)
Siblings Who Have Been Graduated	24 (52.2%)	189 (46.1%)
Siblings Who Have Dropped Out	10 (21.7%)	91 (22.2%)
Current Grade Level:		
9th	32 (69.6%)	305 (74.4%)
10th	14 (30.4%)	100 (24.4%)
11th	0	5 (1.2%)
Ever Repeated a Grade: Yes	15 (32.6%)	91 (22.2%)
Post-School Plans:		
Unsure	1 (2.1%)	20 (4.9%)
Employment	3 (6.5%)	29 (7.1%)
2-year College	16 (34.8%)	99 (24.1%)
4-year College	24 (52.2%)	236 (57.6%)
Military	2 (4.4%)	26 (6.3%)

[1] Includes living with wife/girlfriend, husband/boyfriend, self, or people not related to the student.
[2] Includes adult diploma and General Education Development (GED) Diploma.

We had generated this list from an earlier survey and had asked the algebra teachers, as a group, to approve a set of eight interventions and four accommodations that they were currently using to some degree or would consider using in their classes.

Procedure

The authors administered the survey in a group format to each of the 14 algebra classes in the participating in district. The surveys were administered during prescheduled class times. Class size ranged from 15 to 24 students. Each survey administration included a minimum of two adults for supervision and assistance. In classes with 20 or more students, the classroom assistant or teacher provided additional support. In each case, students were familiar with each of the adults. The participant-to-adult ratio ensured that students had easy access to help with or clarification of questions, if needed. The administration of the survey took 15-20 minutes per class. All students chose to participate and received one dollar for their time.

Table 2

Favorite High School Class and Why (44 or 95.7% of Respondents)

Class	Supporting Quotes
PE Classes (9 or 21%)	It's fun and we don't stay in the same seat all class; Because the teacher is cool; It's fun; Learn a lot and the teacher doesn't teach it all fast; It has fun stuff; Because I get to work out; You do your own thing; We don't do anything; Get to do a lot of stuff.
Math (6 or 14%)	I like the teacher; It's the only thing I'm good at; We have fun; I like math because it's easy and I don't forget how to do it; It's easy; It's fun.
Science (6 or 14%)	Because we have learned a lot of different things about space and did lots of projects and fun activities; Because the teacher is real down to earth and understands things; Fun teacher, not by the book; Hands-on; It is fun; I like science.
Art (6 or 14%)	Because I get to use my own skills in drawing to make things look cool; My friends are in there and learn some useful things; 'Cause it's fun and you can chat with your friends; You get to express yourself; Not much work; I love doing things that let you show what you feel on paper in colors.
History (5 or 11%)	I know a lot about the laws and I like learning more; The teacher makes it very interesting; It is easy; Because you can learn more things; My best subject.
Carpentry (3 or 7%)	Can make stuff; We build stuff and it teaches a good skill to have in the world; You get to work outside.
English (3 or 6%)	I like English and language; The teacher is really neat and she puts learning into fun things.
ROTC (2 or 4%)	Teaches responsibility; We get to do fun things.
Study Hall (2 or 4%)	I don't do anything; How she did the class.
Agriculture (1 or 2%)	It is what I want to do with my life.
Crafts (1 or 2%)	We get to make different things.

Table 3
Least Favorite High School Class (44 or 95.7% of Respondents)

Class	Supporting Quotes
Math (24 or 55%)	Don't remember stuff; It's not that I'm dumb but when it comes to math there is a wall there; Too hard (3); The teacher does not care about her students and doesn't teach much; It's so easy; It's so boring; I'm not good at math and it's confusing; Algebra is complicated; Don't care for the teacher; The teacher is not easy to work with at all; The teacher was cold and hated me because of how I dress; I just don't like math; Some people just don't get it and I'm one of them; It's boring; I don't like it; I don't get it; Not very good at it; I don't really understand it; I don't like it; Because I just never got an interest in math and we can't wear hats and use pens; It is sometimes hard.
English (7 or 16%)	I can't read; Because I just can't seem to do anything right; Writing for the writing test; I have a hard time reading; Hard; Boring, uninteresting; Don't like writing.
Science (4 or 9%)	Teacher did not know what she was doing; I'm not good at science, hard; I don't like the way she teaches and too much work; It moves too fast.
History (4 or 9%)	It's basic but the teacher teaches like it's an honors class; Hard; Everything is over my head; It only talks about slavery.
Technology (2 or 5%)	It sucks; I love computers but all that we do is type all day; we really don't learn about computers.
Chorus	Teacher is not at all nice.
Reading	It is not easy.
Business Class	All I do in that class is stocks, which I have learned from my dad.

RESULTS

The results will be reported under the following four subheadings: Favorite and Least Favorite High School Class; The Best Part and the Worst Part of Algebra Class; Helping Students Do Better in the Algebra Class; and Helpfulness of Teacher-Derived Interventions. In each of the initial three subheadings, we report overall response rates, response rates for constructed themes, and illustrative responses. The overall response rates are calculations of the number of respondents for each item with respective response ratings for the response sets.

The constructed themes reflect statements that we believe summarize subsets of responses. To qualify as a theme or subset, we used a criterion of accounting for at least 20% of all responses for the respective item. The constructive themes, as recommended by Patton (2002) and Strauss and Corbin (1998), summarize the meaning of individual quotes that appear related in meaning. The remaining quotes from peers without LD are accessible at a project website (see Author Notes). For the fourth subheading, we report response rates and percentages.

Under the final subheading, Helpfulness of Teacher-Deprived Interventions, student responses are recorded in terms of their perceptions of the utility of various teacher-identified interventions. The interventions were nominated by the algebra teachers as interventions they, as a group, currently deploy or would consider deploying. Students reported whether they felt such

interventions would be helpful (yes or no). We also examined the respective response patterns by the presence of a handicapping condition using a nonparametric test (the chi square).

Favorite and Least Favorite High School Class

As illustrated in Table 2, a small majority of participants reported that nonacademic classes were their most favorite classes (i.e., physical education classes, art classes, carpentry, reserve officers training or ROTC, study hall, agriculture, and crafts). Math classes (inclusive of algebra and pre-algebra) were the favorite class for a small minority (14%) of students, an overall pattern consistent with each of the other academic areas (science at 14%, history at 11%, and English at 6%). In total, the academic classes accounted for 45% of the total responses. While the statements were insufficient in number to yield any prominent themes, participants reporting math as their favorite class suggested that this was where they experienced success, had fun, or found the work to be easy. This pattern was consistent for the other academic classes. Nonacademic classes, in contrast, were reported to be the most favorite because of participants' perception that they were fun, offered more freedom, taught them something deemed relevant, or included enjoyable activities.

In comparison for overall rates, general education peers demonstrated a similar pattern for reporting academic classes as their best, including math classes (22%), English (12%), history (10%), and science (8%), accounting for 52% of all responses. Nonacademic classes accounted for a near majority, including physical education (15%), the arts (13%), and vocational courses (6%). Other favorite courses include ROTC (5%), computers (4%), foods and nutrition (4%), and communication (2%). Due to space limitations we did not compare their actual reasons, but this information is available (see Author Notes).

Table 4
What Is the Most Difficult Part of Algebra Class (44, or 95.7% of Respondents)

Theme	Supporting Quotes
The Work (18 or 41%)	Homework; The work we do; Understanding the work; The work is too hard; Trying to understand the different ways for how to solve problems; Trying to remember all of the steps when doing problems; Trying to understand it when the teacher goes so fast; When I'm confused, I still am expected to do my work; Some of the math problems I don't get at first; The most difficult part about this class is that sometimes there is some things I do not understand; Sometimes I have difficulty with some mathematical situations; When I don't understand something; Some of the problems are difficult; Understanding the stuff; Understanding the stuff; the homework; Math problems, and sometimes hard to understand some problems; Finding percents on problems; Fractions, mixed numbers.
Tests (16%)	The test that we have in this class; the tests; Taking the tests because my mind goes blank; The test, 'cause you need to study a lot; Quizzes and tests; Quizzes and tests; The tests.
The Teacher (5 or 11%)	Putting up with the teacher; Understanding what the teacher is teaching; The teacher, she does not give any help; When I do not know how to do something, I am afraid I will be made fun of.
Boring (9%)	Staying awake; It's boring; Paying attention; Staying awake.
Nothing (11%)	Nothing; Nothing; Nothing; Nothing; Nothing so far.
Other	Dividing; Remembering everything; Everything; Not using a calculator; The whole class; Not all of it is difficult.

Table 5
What Is the Best Part of the Class? (46, or 100% of respondents)

Theme	Supporting Quotes
Friends (20%)	My friends; Working in groups; Friends; Friends in class; The people are nice and help you when you need it; Group work; Getting to know people and talking; Working as group; Being with friends.
Learning (17%)	Learning something new and sometimes working in groups; It is good to learn math because you will need to know how to do it the rest of your life; Learning new things; After someone explains things to me, then I can understand and learn; Learning how to do them when I can't figure problems out at first; Learning more; When I really know how to do it then I like it; When you understand.
Easy (13%)	Doing easy work; Easy reviews; It is easy; I know every damn thing; The tests are easy; It is easy.
Incentives (9%)	Getting candy when you make a good grade; Being rewarded for good grades; Giving out candy; He gives out candy as a reward.
Teacher (9%)	The teacher is always willing to help; When he teaches on the overhead as long as I am not in the back of the class; The teacher; One-on-one help from teacher.
Computer Lab (6%)	Going to computer lab; Computer time; computer time.
Success (4%)	The test and quizzes, because it is fun to study for it and I get good grades; When I pass a quiz or test.
Other	The best part is nothing; Homework; Nothing; If I pass I get the credit; Ratios and proportions; Getting out; Warm-ups; There is no best part; I don't know; Listening to music; Using the calculator; Fun activities.

Over half of the participants identified math as their least favorite high school class (see Table 3). Their comments suggested that the key themes that made math class their least favorite were that it was too difficult, staffed by a teacher they viewed as uncaring, contained material or work they found uninteresting, or the class was just boring. The remaining academic areas were identified by small minorities of participants as their least favorite with no emerging themes. General education peers also reported that math was their least favorite but at a much lower rate (32%) followed by history (19%), science (17%), and English (11%).

The Best Part and the Worst Part of Algebra Class

Participants' perceptions of the most difficult part of their algebra class focused mainly on a single theme involving the type, complexity, or amount of work (see Table 4). Simply put, they found the algebra assignments to be too complicated for them to be successful. A number of participants also indicated a less dominant theme of having difficulty with the tests or their teacher's teaching style or personality.

Participant perceptions of the best part of class (see Table 5) drew attention to themes involving peers in some way, learning in general, easy work, or a teacher who offered special help. The role of peers suggested that the participants enjoyed working in groups and socializing. Those who described learning as the best part noted that they felt they were learning something they viewed as useful or simply expressed appreciation for being in a class where they were successful. The comments about teachers highlighted how individual teachers had provided special or individual assistance or taught them in a manner they viewed as effective.

Helping Students Do Better in Algebra Class

Participant perceptions of how to help students, defined as peers and themselves, to be more successful

with the work, quizzes, or tests drew responses from 16, 18, and 17 participants, respectively (see Table 6). For the dominant theme for bookwork, 13 respondents pointed out the theme of needing more assistance in some way. Quizzes and tests, meanwhile, drew a combined 35 suggestions from 26 individual participants with all them pointing, directly or indirectly, to a similar theme of needing more assistance or encouragement. Specifically, participants asked for teachers to provide more encouragement or attention, individual or peer assistance, better explanations, or more effective reviews.

Most Important Thing We Could Do to Improve Student Performance

This question, while somewhat redundant, was a final opportunity for participants to offer insight into how to improve student performance in algebra class. In this case, nearly all of the participants provided a response. This time, the responses again revealed a dominant theme of needing more help in some way (see Table 7). "More help" referred to suggestions like offering additional support services, including individual help, tutoring, and encouragement. Less prominent themes included a change in teacher style (e.g., slowing down, better teaching), using more group work, and making class more enjoyable.

Helpfulness of Teacher-Derived Interventions

Participants with LD and their peers then offered a response as to which of eight interventions or four accommodations would help them to be more successful in algebra class (see Table 8). The response pattern, when compared to that of their peers, yielded no significant differences. Large majorities of both groups rated group or pair activities and software programs as the interventions most likely to be helpful, followed by slight majorities favoring training in learning strategies, training in test-taking, daily candy incentives, and music incentives. In terms of accommodations, in both groups slight majorities favored each of the accommodation.

DISCUSSION

Understanding success in algebra must begin with an appreciation that the necessary skills and content are especially problematic for adolescents with LD. At a min-

Table 6
How Can We Help You to Do Better with the Following?

Category	Supporting Quotes
Bookwork (17 responses)	Do not give as much; Do not give as much work; Work with me; Tutoring; Make it easier to understand; Spend more time explaining; Explain it better; Not go so fast when teaching; Tell me to study, tutoring; I'm doing good at it; Get it thoroughly explained more; Do homework; Show more examples; More time; By coming around and asking how we are doing; More in-class work and less homework.
Quizzes (18 responses)	Access to a calculator; Give the answers; Study with me before time; Help us to understand what it is about; Do problems we don't see much; Give more review work; Teacher could explain it better; Have more walls in the classroom to keep from distractions; Pay more attention to us; Make it a little bit more exciting; Make sure everyone knows their stuff; Have not had any trouble lately but did before; Tell me to study; Tutoring; I could study more; Make it understandable; Study more before tests; Not have them; Ask more questions.
Chapter Tests (17 responses)	Let us use a calculator; Give more multiple-choice tests; Not so many; Study more before time; They are harder than our notes; Teach us more beforehand; More review before tests; Go over things before the test; Make them more fun; Teach more details; Tutoring, tell me how to study; Help me find a study technique; Study more; We can have partners; More help the day before; Study more; Read it to us.

Table 7

What Is the Most Important Thing We Could Do to Help Students Do Better in This Class? (43. or 94% of Respondents)

Theme	Supporting Quotes
More Help (16 responses)	Help students out more; Help each student when needed; Take time with a student that may be having difficulty, and please try to be patient; Tutoring with a peer or a teacher; Help out some more; Tutoring; Help students out with the test and quizzes; Teach us how to work out tests; First make sure students know how to do problems; Help students to understand better and go slower; Encourage us more; More one-on-one help; Study with me and make sure I get the lesson; More one-on-one time with the students; More help one-on-one; Help students who need help.
Teaching Style (8 responses)	Take longer time in teaching a subject; Teach more slowly; Not be so rushed for time; Really depends on how the teacher teaches; Give me a different teacher; Make teachers take downers so they will not come to school in a bad mood; Better instruction; Explain the problems more.
Group Work (5 responses)	Let us work in groups more than once a month; More group work and some encouragement from the teacher; You could at least make us have group work; Let us work with partners more; Group work.
More Interesting (5 responses)	Make algebra fun and exciting; Get teachers that make the class fun and not boring; Tell the teacher to lighten up some and stop being so boring; Make more interesting; Make class more fun.
Fewer Distractions (2 responses)	The distractions from students who don't want to learn; Make class less distracting.
Other (7 responses)	Give us a part-time free time to study or whatever; Make it more mature for some students; Teach us how to take tests; Have more tests; Do stuff with the students; Less work; Help me learn to read.

imum, they need to be fluent in basic prerequisite math skills, problem-solving skills in modifying the interpretation of symbols and operations with these symbols, and monitoring the success of their efforts (Mancini, McNaughton, & Ruhl, 1999; National Council of Teachers of Mathematics, 2000). These skills do come easy to any student functioning at the academic level of a typical fifth to sixth grader (see background data), let alone someone who also has a learning disability.

In this study, we established preliminary information relative to student views of their algebra classes. This information provides a basis for making the following recommendations relative to future research and classroom implications.

Prior to a discussion of implications, several limitations warrant consideration. The study included a small number of participants with LD who may not be adequately representative of the general population. Specifically, our sample appears, in comparison to racial information on a national level (see U.S. Department of Education, 2002), to include an overrepresentation of Asian youth and an underrepresentation of African American youth.

Another limitation, one that applies to most any use of surveys, relates to the difficulty of confirming participant honesty. We have no independent verification that the participants were truthful in their responses. We do feel confident, however, that they took the survey

seriously. This confidence stems from the fact that only two surveys required us to ask the participant for additional information as to their response (in both cases we could not read their writing on a specific item), and that all of the participants were willing to provide responses, in spite of the option of not answering specific questions or declining participating in its entirety.

Finally, the study was limited by the questions included. While we involved teachers and administrators in the design of the specific questions and believe that their involvement enhanced the appropriateness of the questions, there probably are other questions that would warrant consideration.

Future Research Implications

One central issue involves a better understanding of the key setting requirements of high school algebra classes. The study provided preliminary insight into student perceptions of these classes. Future research should examine the teachers' view of specific course requirements or expectations, instructional features and their views of what works to augment insight gained from the findings. Findings showed that students perceived algebra or math as their least favorite class. This perception was primarily influenced by the perceived difficulty of the course, lack of access to what students perceived as a caring teacher, or lack of interesting material or activities. Teachers may perceive similar concerns or have a totally different perception of their classrooms and teaching. Likewise, the participants offered insight into what they perceived as the best and worst parts of their algebra class and offered suggestions for improvement. Again, it would be interesting to determine how teachers would respond to feedback from their student consumers and develop specific responses to these concerns. If teachers see little or no merit to the concerns of students, they would have little motivation for pursuing change.

A related issue involves helping teachers develop alternative forms of accessing important course information as promoted by the concept of universal design of learning (UDL). The promise of UDL lies in its ability to make course content available to a wider range of stu-

Table 8

Do You Feel the Following Interventions or Accommodations Would Be Helpful? (N and % Reporting Yes)

Item Description *N* (%)	LD 46	Non-LD 410
Interventions		
Group or Pair Activities	37 (80.4%)	334 (81.5%)
Software Programs to Teach Algebra	34 (82.9%)	287 (70%)
Daily Candy Incentives	29 (63%)	259 (63.2%)
Training in Learning Strategies	32 (69.6%)	237 (57.8%)
Tape Town Incentive for Grades	23 (50%)	271 (66.1%)
Training in Test Taking	28 (60.9%)	226 (55.1%)
Peer or Senior Tutors	20 (43.4%)	240 (58.5%)
Graduate Student Assistant	17 (37%)	168 (41%)
Accommodations		
Additional Encouragement from Teacher	30 (65.2%)	299 (72.9%)
More Individual or Small-Group Help	31 (67.4%)	279 (68.1%)
Time Extensions for Tests and Homework	30 (65.2%)	277 (67.6%)
Reduced Classroom Distractions	30 (65.2%)	250 (65.1%)

dents, including those with LD (Rose & Meyer, 2002). Currently, the "best served" students are those who can succeed in traditional lecture format while accessing information from a standard textbook, yet many participants in this study seemed to suggest that they needed alternative formats. This message offers support for the UDL concept. For instance, the number-one idea for how to foster improvement was the call for more help in some way. The participants, as a group, appeared interested in being successful and identified a need for more help (e.g., peer tutors, individual assistance, group work) as central to accessing the necessary information and to be successful. Future research must examine the deployment of UDL interventions for providing alternative means of helping them access specific and general course content information. In particular, research needs to incorporate student feedback as to what interventions or accommodations are most effective for given subjects or settings.

Classroom Implications

Based on the consumers' point of view, this study suggests that successful interventions in high school algebra should include such features as student access to services that provide additional support or assistance, caring teachers who work to reduce the complexity of algebraic concepts and problems, interesting and relevant activities and materials, and more group work. Furthermore, small majorities of participants suggested that software programs, general or specific incentives, and training in learning and test-taking strategies would be helpful.

The key is to help high school algebra teachers to incorporate these components into their classrooms and help them to identify which components prove most effective. The role of the high school special educator then becomes one of helping general education peers to implement and evaluate various alternatives with an emphasis on helping bring evidence-based practices to the classroom (Coalition for Evidence-Based Policy, 2002).

A final implication is that high school students may be ready to play a more important role in their classes. Their voice on such matters as algebra may be worth listening to. For instance, nearly all of the participants provided specific ideas or concerns related to their algebra class. Many of their comments represent an obvious link to self-determination. Their responses conveyed distinct perceptions about what was working and not working, and how things could be improved. These perceptions seem appropriate for the goal of helping students to succeed and take on a more active role in their education. As such, the role of educators, as suggested by Eisenman and Chamberlin (2001), perhaps should become one of facilitators who help students to take more ownership of the Individual Educational Program and their eventual performance in high school classes. The results of this study provide initial evidence, in the form of what students think can improve their success, that demonstrates an interest in what might be termed "self-directed success."

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Requests for reprints should be addressed to: Larry Kortering, 124 Duncan Hall, Appalachian State University, Boone, NC 28608; korteringlj@appstate.edu